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RN **126341-88-6** REGISTRY
CN Synthase, trehalose (9CI) (CA INDEX NAME)
OTHER NAMES:
CN Trehalose synthase
CN Trehalose synthetase
MF Unspecified
CI MAN
SR CA
LC STN Files: AGRICOLA, BIOBUSINESS, BIOSIS, CA, CAPLUS, PROMT, TOXLIT,
USPATFULL

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
31 REFERENCES IN FILE CA (1967 TO DATE)
31 REFERENCES IN FILE CAPLUS (1967 TO DATE)

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NiceZyme View of ENZYME: EC 5.4.99.16

Official Name	
Maltose alpha-D-glucosyltransferase.	
Alternative Name(s)	
Trehalose synthase. Maltose glucosylmutase.	
Reaction catalysed	
$\text{Maltose} \rightleftharpoons \text{alpha, alpha-trehalose}$	
Cross-References	
BRENDA	5.4.99.16
EMP/PUMA	5.4.99.16
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BRENDA:5.4.99.16

E.C. number	5.4.99.16 (BRENDA copyright notice)
Original Organism	<p>#1# <u>Thermus aquaticus</u> (ATCC 33923 <3>) <1,3,4></p> <p>#2# <u>Pimelobacter</u> sp. (strain R48 <2>) <2></p> <p>#3# <u>Pseudomonas</u> sp. (strain F1 <5>) <5></p>
Systematic name	Maltose alpha-D-glucosylmutase
Recommended name	Maltose alpha-D-glucosyltransferase
Synonyms	<ul style="list-style-type: none"> ⌚ Synthase, trehalose (<i>Thermus aquaticus</i> strain ATCC33923 clone pBTM5) ⌚ Synthase, trehalose (<i>Saccharomyces cerevisiae</i> gene TSL1 subunit) ⌚ Maltose glucosylmutase ⌚ Trehalose synthase ⌚ Protein (<i>Saccharomyces cerevisiae</i> gene CIF1 reduced) ⌚ 57-KDa trehalose synthase (<i>Saccharomyces cerevisiae</i>) ⌚ Synthase, trehalose (<i>Pimelobacter</i> strain R48 clone pBRM8 gene treS precursor reduced) ⌚ Trehalose synthase (<i>Pimelobacter</i> strain R48 clone pBRM8 gene treS precursor reduced) ⌚ Protein (<i>Saccharomyces cerevisiae</i> clone pMB14 gene CIF reduced) ⌚ Trehalose synthetase ⌚ Maltose alpha-D-glucosylmutase ⌚ Synthase, trehalose (<i>Saccharomyces cerevisiae</i> gene TPS1 subunit) ⌚ Synthase, trehalose

CAS registration number	<ul style="list-style-type: none"> ⌚ 178604-93-8 (synthase, trehalose (Pimelobacter strain R48 clone pBRM8 gene treS precursor reduced) /trehalose synthase (Pimelobacter strain R48 clone pBRM8 gene treS precursor reduced)) ⌚ 147994-22-7 (protein (Saccharomyces cerevisiae clone pMB14 gene CIF reduced) /57-KDa trehalose synthase (Saccharomyces cerevisiae gene CIF1) /protein (Saccharomyces cerevisiae gene CIF1 reduced) /synthase, trehalose (Saccharomyces cerevisiae gene TPS1 subunit)) ⌚ 211621-92-0 (synthase, trehalose (Saccharomyces cerevisiae gene TSL1 subunit)) ⌚ 187285-67-2 (synthase, trehalose (Thermus aquaticus strain ATCC33923 clone pBTM5)) ⌚ 126341-88-6
Reaction	Maltose = alpha,alpha-trehalose
Reaction type	Glycosyl bond isomerization
Substrates/products	<ul style="list-style-type: none"> ⌚ S: Maltose #<u>1</u>-<u>3</u># (#<u>2</u>#, r <<u>2</u>>) <<u>1</u>-<u>3</u>,<u>5</u>> P: alpha,alpha-Trehalose #<u>1</u>-<u>3</u># <<u>1</u>-<u>3</u>,<u>5</u>> ⌚ S: Sucrose #<u>1</u># (#<u>1</u>#, activity is very low compared to that with maltose) <<u>3</u>> P: Trehalulose #<u>1</u># (#<u>1</u>#, i.e. 1-O-alpha-D-glucopyranosyl-D-fructose) <<u>2</u>>
Specific activity (micromol/min/mg)	<ul style="list-style-type: none"> ⌚ 135 #<u>1</u># <<u>1</u>> ⌚ 41.2 #<u>3</u># <<u>5</u>> ⌚ 16.8 #<u>1</u># <<u>1</u>>
Km-value (mM)	<ul style="list-style-type: none"> ⌚ 158 #<u>1</u># {trehalose} (#<u>1</u>#) <<u>3</u>> ⌚ 96.5 #<u>1</u># {sucrose} (#<u>1</u>#) <<u>3</u>> ⌚ 34.5 #<u>1</u># {maltose} (#<u>1</u>#) <<u>3</u>> ⌚ 26 #<u>3</u># {trehalose} (#<u>3</u>#) <<u>5</u>> ⌚ 1.1 #<u>3</u># {maltose} (#<u>3</u>#) <<u>5</u>>
pH-optimum	<ul style="list-style-type: none"> ⌚ 8-9 #<u>3</u># <<u>5</u>> ⌚ 7.5 #<u>2</u># <<u>2</u>> ⌚ 6.5 #<u>1</u># <<u>1</u>>
pH-range	5-7 # <u>1</u> # (# <u>1</u> #, pH 5: about 25% of maximal activity, pH 7: about 55% of maximal activity) < <u>1</u> >

Temperature-optimum (deg.C)	<ul style="list-style-type: none"> ⌚ 65 #<u>1</u># <<u>1</u>> ⌚ 45 #<u>3</u># <<u>5</u>> ⌚ 40 #<u>1</u># (#<u>1</u>#, maximal yield of trehalulose from sucrose) <<u>3</u>> ⌚ 20 #<u>2</u># <<u>2</u>>
Inhibitors	<ul style="list-style-type: none"> ⌚ Cu²⁺ #<u>1,2</u># <<u>1,2</u>> ⌚ Hg²⁺ #<u>1,2</u># <<u>1,2</u>> ⌚ Ni²⁺ #<u>2</u># <<u>2</u>> ⌚ Sucrose #<u>1</u># (#<u>1</u>#, competitive inhibition of the interconversion between maltose and trehalose) <<u>3</u>> ⌚ Tris #<u>1,2</u># <<u>1,2</u>> ⌚ Zn²⁺ #<u>1,2</u># <<u>1,2</u>>
Purification	<ul style="list-style-type: none"> ⌚ #<u>1</u># <<u>1</u>> ⌚ #<u>2</u># <<u>2</u>> ⌚ #<u>3</u># <<u>5</u>>
Molecular Weight	250000 # <u>3</u> # (# <u>3</u> #, gel filtration) < <u>5</u> >
Subunits	<ul style="list-style-type: none"> ⌚ ? #<u>1</u># (#<u>1</u>#, x * 105000, SDS-PAGE <<u>1</u>>; #<u>1</u>#, x * 110000, calculation from nucleotide sequence <<u>4</u>>) <<u>1,4</u>> ⌚ Tetramer #<u>3</u># (#<u>3</u>#, 4 * 67000, SDS-PAGE) <<u>5</u>>
Cloned	# <u>1</u> # < <u>4</u> >
pH-stability	<ul style="list-style-type: none"> ⌚ 7-9 #<u>3</u># (#<u>3</u>#, 37 C, 1 h, stable) <<u>5</u>> ⌚ 6-9 #<u>2</u># (#<u>2</u>#, 20 C, 60 min, stable) <<u>2</u>> ⌚ 5.5-9.5 #<u>1</u># (#<u>1</u>#, 60 C, 60 min, stable) <<u>1</u>>
Temperature stability (deg.C)	<ul style="list-style-type: none"> ⌚ 80 #<u>1</u># (#<u>1</u>#, pH 7.0, 60 min, stable up to) <<u>1</u>> ⌚ 55 #<u>3</u># (#<u>3</u>#, pH 7.0, 1 h, stable below) <<u>5</u>> ⌚ 30 #<u>2</u># (#<u>2</u>#, pH 7.0, 60 min, stable up to) <<u>2</u>>

References

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- <4> Tsusaki, K.; Nishimoto, T.; Nakada, T.; Kubota, M.; Chaen, H.; Fukuda, S.; Sugimoto, T.; Kurimoto, M.: Cloning and sequencing of trehalose synthase gene from *Thermus aquaticus* ATCC33923:: Biochim. Biophys. Acta, 1334; 28-32 (1997) (c)
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